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Side effects of COVID-19 third booster dose among healthcare workers in Saudi Arabia

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ABSTRACT

The number of COVID-19 cases has continued to rise since the World Health Organization (WHO) declared the Coronavirus Disease 2019 (COVID-19) as a global pandemic in March 2020. At this time, WHO has received reports of about 460 million confirmed illnesses and over 6 million deaths. In Saudi Arabia, the number of confirmed cases has nearly surpassed 750 thousand, with COVID-19 responsible for approximately 9,000 deaths. Vaccination is the most effective approach to prevent this pandemic, and persons who have had three doses are better protected than those who have not. The goal of this study is to look into the adverse effects of COVID-19 vaccine after the third booster dosage in Saudi Arabian healthcare personnel. Between November 2021 and April 2022, a cross-sectional survey was conducted using simply a questionnaire. Pain at injection site was the commonest side effect, followed by fatigue and headache. There is a temperature and edema at the injection site, respectively. 27.71 percent of female participants experienced menstrual cycle changes such as delayed or menorrhagia. The side effects are comparable to those experienced after the first and second COVID-19 vaccination doses. More research on long-term side effects, as well as studies into the relationship between menstrual cycle changes and COVID-19 vaccination, is needed.

Keywords: Third booster dose, COVID-19, Side effects, healthcare workers, Saudi Arabia

1. INTRODUCTION

Coronavirus 2 (SARS-CoV-2), a novel member of the human coronavirus family, was identified as the causative agent of a new illness outbreak in China in 2019, which was linked to serious medical consequences and sometimes even death (El-Shitany et al, 2021). Pfizer-BioNTech, Moderna (COVID-19 mRNA vaccines), and Johnson & Johnson's (Janssen) COVID-19 vaccine are the three COVID-19 vaccines that are currently endorsed for use in

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the U. S. A. to prevent COVID-19, with the COVID-19 mRNA vaccines being preferred (Hajra et al., 2022). Several governments mandated immunization for eligible individuals as soon as vaccines were authorized in order to boost vaccination rates.

Saudi Arabia's Ministry of Health (MOH) has approved the following vaccines. Pfizer-BioNTech is ranked first, followed by Moderna, Oxford-AstraZeneca, and Janssen-Cilag (Almughais et al., 2022). COVID-19 vaccination effectiveness has reduced in recent months among persons who have been fully vaccinated, according to a study conducted between May 3 and July 25 2021 (received two doses or one dose according to the type of COVID-19 vaccine they have received) (Rosenberg et al., 2021). Early research on these vaccines revealed that the majority of their side effects are acute in character, lasting 1 to 10 days (Dar-Odeh et al., 2022). Local symptoms at the injection site were described as well as systemic transitory indications such as weariness, headache, and fever, among others (Dzieciolowska et al., 2021). Although mandated vaccine campaigns in underdeveloped countries proceeded rather well, there were isolated instances of phony vaccine certificates or fake viral testing being used to avoid vaccination (Mbunge et al., 2021).

The Centers for Prevention and Disease Control published that a booster dose of COVID-19 vaccine will be needed to maximize vaccine-induced protection and prolong its durability (Newsroom, 2021). MOH in Saudi Arabia recommends taking a COVID-19 booster dose vaccine for people aged 16 and over after 3 months of the second dose. Common side effects of COVID-19 vaccines can be divided into local and systemic. Local are pain, redness and swelling at the site of injection while systemic are tiredness, headache, muscle pain, chills, fever and nausea. Today, the number of people who have received a booster dose in Saudi Arabia is over 11.6 million (Asdaq et al., 2022).

The target of this study is to ascertain the negative consequences of the booster dose, the most frequent side effect, and the justifications for not administering a booster dose.

2. MATERIALS AND METHODS

First and importantly, the PSA University Ethical Committee approved our research, Al-Kharj (SCBR-032-2022). Between November 2021 and April 2022, a cross-sectional survey was conducted using simply a questionnaire. The purpose of the study is to understand how the third COVID-19 booster dose affects healthcare personnel within 7 days after receiving the dose.

Inclusion criteria were: participant must be health care workers were included. All of them have received the third booster dose. An online survey questionnaire through Google Forms was used to collect the data. The questionnaire was developed following an extensive review of the literature and later distributed through social media platforms. It conducted in the central region of Saudi Arabia, specifically Al-Riyadh and Al-Kharj cities. The survey was an online-based questionnaire containing multiple-choice questions. There were four sections in the questionnaire. The first was about the explanation of the research goals and consent. The second section had questions about the socio-demographic data, and they were: gender, weight, height, educational level, occupation, workplace, and whether the recipient had received the third booster dose or not. The third section contained questions about the adverse effects of the third booster dose on musculoskeletal, respiratory, and gastrointestinal systems. The last one was whether you would take the fourth booster dose if it was available or not. It was only for participants who did not receive the third booster dose and why they did not receive it.

Statistical analysis has been done using the IBM SPSS Statistics program. P-value 0.05, Confidence interval 95% for the descriptive statistics we used frequency and proportions for categorical variables and mean and standard of deviation for continuous variables. For comparison between groups, we used the chi-square test and also Kruskal-Wallis test. Chi square test used to compare observed results with expected results. Kruskal-Wallis is used because we have ordinal variables.

3. RESULTS

The study included 330 participants from Al-Riyadh and Al Kharj regions of Saudi Arabia. We have received 330 responses, and after applying the exclusion and inclusion criteria, the number of responses became 276. 83 % of the tasks were finished and accounted for in the study. By gender, we have 134 (44.7%) male participants and 166 (55.3%) female participants (Table 1). According to occupation, there were 90 doctors (30%), 76 nurses (25.3%), 57 specialists (not doctors) (19%), 37 pharmacists (12.3%), 24 technicians (8%), and 16 administrative (5.3%) (Fig. 1). Regarding the vaccine type participants have received, Pfizer/BioNTech 218 (72.7%), Moderna 49 (16.3%), and Oxford/AstraZeneca 9 (3%). Pain at the site of injection was the most reported adverse effect (226 participants, 81.88%) after the third dose of the COVID-19 vaccine, followed by fatigue (167, 60.5%), headache (118, 42.75%), fever (96, 34.78%) and swelling at the place of injection (72, 26.1%) (Table 2).

In terms of COVID-19 infection history, roughly 19 percent of the study participants had previously tested positive for COVID-19.The Pfizer vaccination was the most popular among the study group, with 78.9% of the people receiving it if the fourth dose is

provided, 135 (48.91%) of participants consent to take it. After the vaccine, 92.8 percent of the vaccinated respondents had no COVID-19 infection. The majority of the individuals (86.9%, or 240) experienced at least one of the described post-vaccination adverse effects (Table 3, Fig. 2).

Table 1 General Characteristics of the participants

	Number	Percent %	P value
Age (Mean, Standard Deviation)	34.11	8.979	0.011
Gender			
Male	134	44.7%	0.331
Female	166	55.3%	
Occupation			
Doctor	90	30%	0.127
Nurse	76	25.3%	0.361
Specialist (not a doctor)	57	19%	0.211
Pharmacist	37	12.3%	0.275
Technician	24	8%	0.001
Administrative	16	5.3%	0.001
Education			
Diploma	64	21.3%	0.041
Bachelor's degree	178	59.3%	0.131
Master's degree	20	6.7%	0.001
PhD or equivalent	38	12.7%	0.321
Workplace			
Ministry of Health	141	47%	0.121
Ministry of Defense	43	14.3%	0.131
Private facility	65	21.7%	0.001
University hospital	51	17%	0.001
Participants received the third dose			
Yes	276	92%	0.001
No	24	8%	0.001
Vaccine type			
Pfizer/BioNTech	218	72.7%	0.001

Moderna	49	16.3%	0.021
Oxford/AstraZeneca	9	3%	0.111

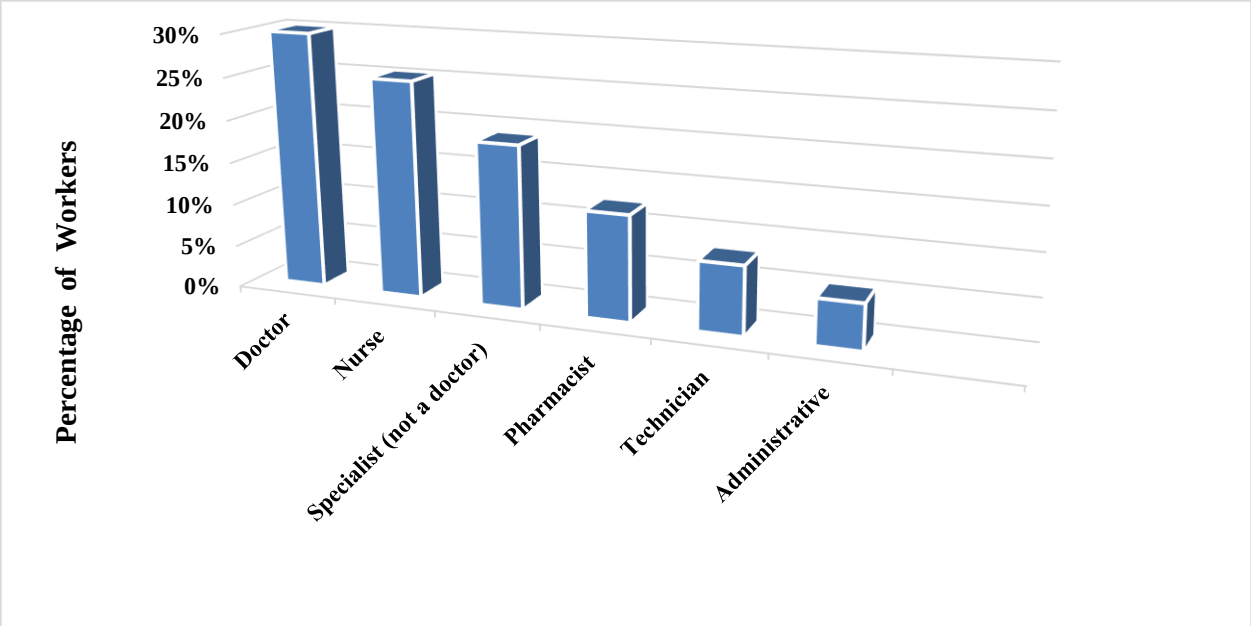

Figure 1 Percentage of occupation of health care workers participating in our study.

Table 2 Association between the vaccine types and adverse events after receiving the third dose (n=276)

	Pfizer/BioNTech	Moderna	Oxford/AstraZeneca	Total	P-value
Pain at the injection site	180	40	6	226	0.478
Fatigue	128	34	5	167	0.367
Headache	91	23	4	118	0.798
Fever	74	19	3	96	0.811
Swelling at the injection place	54	15	3	72	0.618
Menstrual cycle changes	34	8	4	46	0.075
Hair loss	37	4	2	43	0.263
Increase in sleep	29	11	0	40	0.118
Decrease in memory	33	5	1	39	0.646
Redness at place the injection	28	7	2	37	0.707
Joint pain	23	10	3	36	0.033
Tremor	21	11	2	34	0.031
Vertigo or In coordination	16	3	0	19	0.677
Numbness or Tingling	10	3	0	13	0.715
Ringing sensation in ears	11	2	0	13	0.762

Table 3 COVID-19 infection history and vaccination data among vaccinated people

	Number	Percent %
Previously had positive test for COVID-19		
Yes	57	19 %
No	243	81 %
Type of vaccine		
Pfizer/BioNTech	218	78.9%
Moderna	49	17.75 %
Oxford/AstraZeneca	9	3.2 %
Infected with COVID-19 after vaccination		
After 1st dose	14	5.07 %
After 2nd dose	46	16.6 %
No	248	92.8 %
Post-vaccination side-effects		
Yes	240	86.9 %
No	36	13.04 %
Participants who Agree to have fourth dose if it is available?		
Yes	135	48.91%
No	141	51 %

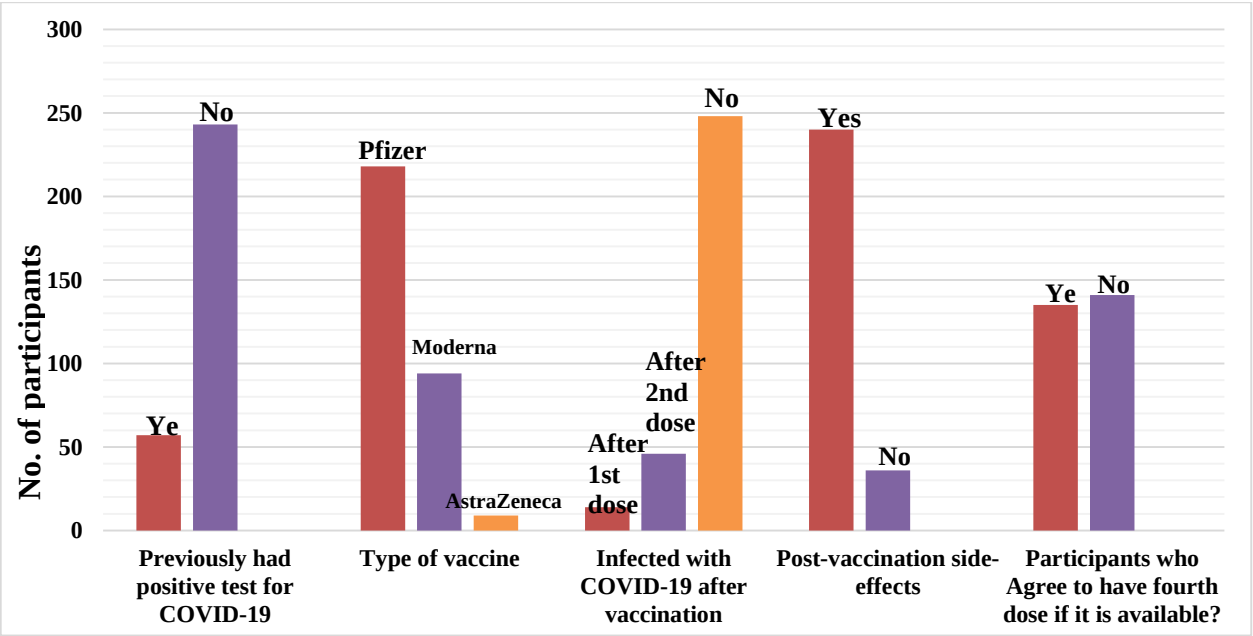

Figure 2 COVID-19 infection history and vaccination data among vaccinated people.

4. DISCUSSION

People have been concerned about the dangers and risks of providing vaccines since they were first developed. This study aimed to determine the adverse effects of the third booster dose of the COVID-19 vaccine among healthcare workers in Saudi Arabia. According to our results, vaccine recipients can expect local side effects like pain at the site of injection, swelling, and redness. Also, systemic side effects such as fatigue, headache and fever. There were no major systemic side effects after receiving the third dosage vaccine, merely headache and fatigue, according to clinical trials. The most frequent side effects, which are comparable to those listed by the Centers for Prevention and Disease Control, were headache, weariness, fever, and soreness at the injection site (Omeish et al., 2022).

However, a study conducted between May 3 and July 25 2021, found COVID-19 vaccine effectiveness has declined in recent months among adults who have gotten fully vaccinated (received two doses or one dose according to the type of COVID-19 vaccine they have received) (Rosenberg et al., 2021). Also, recent study found that receipt of 3 doses of mRNA vaccine protects from Omicron and delta variants, compared to be an unvaccinated or receipt of 2 doses only (Accorsi et al., 2022). Another research found vaccine effectiveness estimation against COVID-19 during both Delta and Omicron-predominant periods were the highest in adults who received a booster dose of mRNA vaccine (Thompson, 2022).

Our findings are in line with earlier studies that looked at the short-term negative effects of COVID-19 vaccines approved in Saudi Arabia, Oxford-AstraZeneca vaccines, and Pfizer-BioNTech vaccines (Alhasan et al., 2021). It is recommended for every individual to take the third COVID-19 booster dose of vaccine in order to stop the COVID-19 pandemic. Health authorities should give more information to people about the adverse effects of COVID-19 vaccine and how to deal with them. More studies are needed to evaluate the long-term adverse effects. There is a need for research on the connection between menstrual cycle changes and the COVID-19 vaccine.

The study has limitations since it uses a cross-sectional design, which captures data at a point in time when individual attitudes are actually dynamic and changing, such as willingness to accept the booster dose. On the other hand, this study investigated self-reported symptoms using anonymous responses; the vaccination and reported symptoms were not verified or confirmed, nor were they officially recorded or documented by the study investigators. Lastly, the above-mentioned symptoms occurred within a week of the vaccines in the post-vaccination phase; the vaccines' latent effects were not studied or included in this study; a long-term follow-up study in the general population is recommended.

5. CONCLUSION

In conclusion, despite the high prevalence of post-vaccination side effects among participants, this study indicated that the majority of post-vaccination side effects are common symptoms that may be encountered with various vaccines. However, to have a better understanding of the relationship between adverse effects and the third booster dose, a long-term follow-up research in the general population should be done.

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Authors' Contributions

All authors contributed to the research and/or preparation of the manuscript. Naif Alrudian, Mohammad Mokhatrish and Muath A.Alghuwainem participated in the study design and wrote the first draft of the manuscript. Abdullah T. Alhaddad, Sami Shami Alanaziand Muath Abdullah Altamimi collected and processed the samples. Luay Mohammed Alahmadi, Abdulrahman Khulaif Aleneziand Ali Hassan A. Ali participated in the study design and performed the statistical analyses. All of the authors read and approved the final manuscript.

Ethics Approval

All series of steps that were implemented in this study that included animal models were in compliance with Ethics Committee of Prince Sattam bin Abdulaziz University Institutional Review Board (SCBR-032-2022).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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